Super-size It! Making a Difference With Scleral Lenses

Scleral lenses change lives, and they’re not just for diseased or injured eyes, according to these experts. Learn their fitting strategies and how to avoid the single biggest mistake clinicians make when beginning to fit these lenses.

By Virginia Pickles, Contributing Editor

Today, there is a great deal of interest in the use of large-diameter corneoscleral and scleral GP lenses for keratoconus, postsurgical eyes and irregular astigmatism. This interview with some of the world’s leading experts explores their views on the indications, fitting methods and design concepts of this rapidly evolving field. —Craig Norman, FCLSA

Scleral lenses have long occupied a niche in contact lens practice as the go-to lenses for traumatized or diseased eyes — eyes that have undergone corneal transplantation or refractive surgery or that are susceptible to recurrent erosions or severe dryness. Certainly, these are still the most-cited indications for scleral lenses — and for good reason, as noted by the clinicians we interviewed — but as these lenses are becoming more readily available, their utility is expanding.

In this article, experts explain why they prescribe scleral lenses, recount their experiences and patients’ responses, and share fitting tips that are adaptable to any practice. First, let’s briefly review the various terms used to describe these lenses.

Large-diameter, mini, semi?

As noted by Rients Visser, founder of Visser Contact Lens Practice in Nijmegen, the Netherlands, an international classification for scleral and large-diameter lenses is lacking. He uses the following guidelines:

- Large diameter: 11–14mm
- Mini scleral: 14–16mm
- Scleral: >16mm

“‘There are exceptions in this classification,’ Dr. Visser notes. ‘For example, on small eyes, as in microphthalmus, a 10mm lens is a large-diameter lens; whereas a 16mm lens on a baby’s eye is a scleral lens.”

Renée E. Reeder, OD, associate professor of optometry and chief, Cornea Center for Clinical Excellence of the Illinois Eye Institute in Chicago, differentiates the lenses as follows:

- Corneoscleral: 11–13mm
- Semi or mini scleral: 13–16mm
- Scleral: >16mm

* Indicates Bausch & Lomb Boston attendance
** Indicates Bausch & Lomb Boston exhibit

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Why scleral lenses?

Dr. Rosenthal explains the basis for the need for (and success of) scleral lenses: “We can start with the premise on which current corneal GP lenses are based. These lenses are designed to rest on and slide over the most sensitive tissue of the human body, the cornea. As patients age and tear production diminishes, the friction created by contact lenses increases, which translates into increased awareness and in some patients even pain. Thus, many patients who previously wore contact lenses successfully are now reporting their comfortable wearing time is decreasing.

“This certainly more exaggerated in eyes with corneal diseases,” Dr. Rosenthal says. “So it seems logical that a GP contact lens would be more comfortable to wear and better tolerated if it avoided all contact with the cornea.”

According to Don Ezekiel, AM, OD, founder of Gelflex Laboratories headquartered in Perth, Western Australia — and whom Dr. Rosenthal calls the “father of the gas permeable scleral lens” — these lenses have obvious benefits. “There is no question that a lens that is stable on the eye, rests on the insensitive sclera and vaults the sensitive cornea is the very best lens for that eye,” Dr. Ezekiel says.

According to Dr. Reeder, the use of larger lenses is on the rise. “It’s not so much increased need as increased availability,” she says. “We can now help patients we couldn’t help before. Materials such as Boston XO,® with higher Dk and good stability make these lenses healthier options. We now have larger buttons that are more readily available. The standardized fitting set and straightforward fitting philosophies of new lenses, such as the MSD from Blanchard, make semi-sclerals easier to use. We also have designs that are customizable and allow us to successfully fit even more challenging patients.”

Scleral lenses are gaining in popularity, according to Jason Jedlicka, OD, who practices in a private, referral-based clinic and also is director of the Contact Lens Clinic at the University of Minnesota Department of Ophthalmology in Minneapolis. “Since I started fitting scleral lenses in the past 8 years or so, reproducibility and materials have improved greatly,” he says.

In addition, Dr. Visser says, new fitting concepts, such as one developed in his practice, facilitate more repeatable, more predictable, less time-consuming fittings, resulting in better vision and increased wearing time. Dr. Visser also credits articles published in professional journals for raising clinicians’ awareness of the benefits of scleral lenses. And patients are learning about them on the Internet.

Considering recent improvements and increased interest in scleral lenses, have the indications changed? These clinicians say no, but they have expanded their use of scleral lenses within the approved indications.

Prime candidates for scleral lenses

Once reserved for the sickest or most damaged eyes, scleral lenses were considered the “end of the line,” the last stop before corneal transplantation, and they retain their utility for these eyes. Many of these patients find their way to the Boston Foundation for Sight, where Dr. Rosenthal appreciates their plight.

“Corneal transplant surgery, even in the best of hands, is one of the most unsatisfying operations in ophthalmology for the patient and the doctor,” Dr. Rosenthal says. “You can have a pristine,
beautiful transplant, but a significant number of patients must be fitted with GP contact lenses to achieve 20/50 visual acuity or better. Whatever a contact lens practitioner can do to keep a patient from having to undergo corneal transplantation is a tremendous contribution to that patient’s quality of life.”

The clinicians we interviewed step up to meet these challenges regularly.

“I fit patients who have a variety of conditions, including advanced globus or post-hydrops keratoconus, pellucid marginal degeneration and postsurgical cases with poor outcomes,” Dr. Reeder says. “It’s remarkable the comfort and vision that can be achieved for patients who may have been resigned to reduced wearing times or reduced vision.”

In addition to these indications, Dr. Jedlicka also prescribes scleral lenses for dry eyes, standard refractive error and presbyopia. “I started fitting scleral lenses in an attempt to find something new and better for my most difficult cases,” he says. “As I’ve become more proficient at fitting them, I’ve started using them for less complex cases. I’ve had so many successes that I now use scleral lenses in up to 50% of my GP cases. Nearly every patient I fit in this type of lens is impressed with the initial comfort, especially if they have worn uncomfortable lenses in the past.”

Dr. Visser classifies the uses of scleral lenses as follows:
1. Visual (mainly irregular corneas)
2. Therapeutic (dry eyes, healing)
3. Protection (scarred eyelids, corneal exposure)
4. Sports (swimming)

Given the numerous indications, these clinicians are confident scleral lenses can be practice-builders for anyone willing to learn, which they say is not difficult.

Getting started
The clinicians we interviewed acknowledge there is a learning curve—although not a steep one—for fitting scleral lenses.

“Honestly, I think the learning curve is not much more complicated than for fitting conical GP lenses,” Dr. Jedlicka says. “If a practitioner is proficient in corneal GP fitting and willing to learn a new technique, it will happen with a little time and effort.”

Based on his experience, Dr. Visser recommends clinicians learn in phases: “First, learn how to follow up with scleral lens patients,” he says. “Then learn how to refit patients, and then try a new fitting. Follow a scleral lens teaching course and seek practical training in an experienced clinic. Ideally, you will be able to learn from colleagues in a setting where you will have more experienced clinicians available for consultation.”

According to Dr. Ezekiel, fitting scleral lenses is basic contact lens fitting done in two stages. First, you fit the corneal part of the lens, and second, the scleral part of the lens. A fitting set is essential, Dr. Reeder says.

“The MSD set is an easy set with which to work,” she says. “Everything you need is right there. Usually, you can achieve success with just a few lenses. You may use 2 or 3 lenses to fit the center. Then, one more lens to fit the periphery. It’s a fairly efficient fit.”

“Articles published in professional journals are raising clinicians’ awareness of the benefits of scleral lenses. And patients are learning about them on the Internet.”
—Rients Visser
Speaking of efficiency, these clinicians agree that you will need more time with your first few scleral lens patients. “Once the first few fits are under the belt, however, the time is comparable to fitting a standard GP lens,” Dr. Jedlicka says. “By the way, for scheduling purposes, I book these patients as complex lens fits like any other complex fit into a smaller-diameter lens.”

What is the biggest mistake clinicians make when beginning to fit scleral lenses? Trying to learn by fitting the most complex cases, Dr. Visser says. “My first mistake was to fit only the most difficult eyes,” he says. “A lot of refits and lenses were necessary to achieve good results, and this was an expensive project that required a lot of patience.”

“Nowadays, with the fitting concept we developed at our practice, fitting scleral lenses takes the same amount of time as fitting regular contact lenses,” Dr. Visser says.

As these clinicians gained experience and achieved expert status, they compiled a list of do’s and don’ts that they generously agreed to share.

**Reading Haptic Compression Patterns**

The principal requirement for a well-fitted scleral lens is to shape the posterior haptic surface to align with the underlying surface of the sclera. The only way today of determining haptic alignment is by looking at the vascular compression pattern under the haptic. The vascular compression pattern is to scleral lenses what fluorescein patterns are to corneal GP lenses. In many cases, it’s obvious, but one cannot be sure until the lenses have settled for 2 to 3 hours.

—Perry Rosenthal, MD

**Voice of experience**

First on Dr. Jedlicka’s list is an emphatic directive — “Get a fitting set!” — which is followed by these tips for successful scleral lens fitting:

1. For nonvaulting lenses, rinse off some of the conditioner with saline before application.
2. For vaulting lenses, use either nonpreserved saline or a low viscosity nonpreserved artificial tear in the bowl.
3. Once the fit looks good, let the lenses settle for 10 to 15 minutes and check the fit again.
4. Expect the lenses to tighten, not only at the fitting visit but also at follow-up visits after wear.
5. Avoid using a lens remover if possible. Teach manual removal techniques to avoid adherence.
6. Don’t panic if you detect some debris under the lenses at follow-up. If the patient is symptomatic (blurry vision with time, decreased comfort) encourage him to remove the lenses, rinse them and reapply them once or twice a day.

Dr. Jedlicka adds a reminder to set your fees appropriately for the time and expertise required to fit scleral lenses. “Don’t worry about patients’ willingness to pay,” he says. “Try lenses on them and let them decide.”

Dr. Ezekiel agrees that professional fees should reflect the specialty nature of these lenses. “Advise your patients that scleral lenses are not throwaway, one-size-fits-all lenses,” he says. “Be sure they know their lenses are custom-made to fit their eyes. It may take a little longer for the fitting to be completed, and there will be an added cost compared to disposable lenses, but once fitted, the same lenses will serve them well for many years.”

Dr. Reeder adds four more factors to improve your fitting skills and your patient’s experience:

1. When working with lenses that are ordered by base curve, don’t be surprised if the base curve is flatter than you expected. Base curve is not as important as height. Work on alignment to slight pooling centrally first.
2. Vault the limbus.
3. Make sure there is no impingement. A 25-minute settling time is nice but not essential to verify this.
4. Don’t sweat the bubbles if they move and are transient. Sometimes fenestration actually induces bubbles in some cases. So, the fit may be fine. You just need to reorder the lenses with no fenestration. (See “Fenestrated vs. Nonfenestrated Lenses” for a brief explanation of these options.)

A final tip from Dr. Rosenthal: “Develop a very close relationship and good communication with the scleral lens manufacturers. This is critical. These lenses require a lot more customization to achieve an optimal result than traditional corneal lenses. To translate clinical findings into lens design parameters requires the clinician and the manufacturer to speak a common language. There has to be a close collaborative relationship.”

Changing lives
A successful scleral lens fit is more than a notation on a chart, as these clinicians have learned. When asked for case examples, they were eager to share.

“It is amazing how scleral lenses improve the lives of most patients,” Dr. Visser says. “They resocialize because they can move more independently. They can go back to work or school; they can participate in sports, recognize friends on the streets and so on. They become different people.” Dr. Visser recalls the following cases as examples of these benefits:

Case 1: A 40-year-old woman with bilateral keratoconus had been wearing corneal GP lenses for a maximum of 2 hours a day. She walked around with her hand protecting her eyes because of extreme photophobia. When she came to see me, she was not optimistic. She said, “I was referred to you because of my bad eye condition, but I don’t believe you can help.” After wearing scleral lenses for 14 days, she was transformed into a happy, positive person.

Case 2: A 48-year-old woman came to me with serious problems after a car accident 25 years before: Brain damage, a blind left eye, a corneal scar on the right eye, no tear production. Treatment over the past 25 years had been artificial tears and ointment. Visual acuity in the right eye was 2/300 (hand motion at 2 meters). With a scleral lens, her visual acuity improved to 20/25. After 25 years, she could see her own children again. At all her follow-up visits, I still get three kisses.

Case 3: A 3-year-old child had eyelid closure defect and corneal exposure keratitis after brain tumor surgery. After 2 weeks of scleral lens wear, the eye was white and the cornea clear (see photos below). Child, parents and clinician are happy.

Fenestrated vs. Nonfenestrated Lenses
There are two principal designs of scleral lenses. One is a nonfenestrated lens that I call fluid-ventilated. The other is an air-ventilated lens. Both of these designs are described by the method in which suction is avoided.

In the fluid-ventilated lens, suction is avoided by allowing miniscule amounts of outside tears to be pulled under the lens to avoid hydrostatic pressure. Whereas the air-ventilated lens aspirates air to avoid suction.

—Perry Rosenthal, MD

“Develop a very close relationship and good communication with the scleral lens manufacturers. ...To translate clinical findings into lens design parameters requires the clinician and the manufacturer to speak a common language.”

—Perry Rosenthal, MD
Start making a difference

Dr. Ezekiel recalls that Dr. Roger Buckley, head of contact lenses at Moorfields Eye Hospital in London, has written in personal correspondence that the scleral lens is the “contact lens par excellence.” There is no optical corneal problem that it won’t help. The clinicians we interviewed are proving the validity of Dr. Buckley’s statement as they consider scleral lenses for a wider variety of conditions.

Adds Dr. Ezekiel, “It does take longer for the lens fittings and after care. However, as serious eyecare practitioners, shouldn’t we consider a patient’s welfare first? If this is the best lens for a patient’s visual well-being, then this must be the lens we choose. I believe that fitting the scleral lenses is the best practice-builder. Providing patients with comfortable all day wear with optimal vision is the best reward for a serious practitioner.”

Seeking Training? Look Here.

Many contact lens education meetings offer courses and workshops on scleral lens fitting. The 2009 Global Specialty Lens Symposium, for example, features a 2-part seminar on this topic. The GSLS will be held Jan. 15-18, 2009, in Las Vegas (healthcareconferencegroup.com/conferences.asp?conf=117). Other sources include:

- Acculens http://www.acculens.com
- Art Optical http://www.artoptical.com
- Blanchard http://www.blanchardlab.com
- Dakota Sciences http://www.soclearlens.com
- Medlens Innovations (540) 636-7976

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Boston® Solutions: Then and Now

After 25 years on the market, Boston solutions continue to support healthy, comfortable lens wear and crisp vision.

The exciting breakthrough development of GP contact lenses was followed almost immediately by disappointing adverse effects, recalls contact lens pioneer Perry Rosenthal, MD, a founding partner of Polymer Technology.

“In 1975, we developed the first Boston lens polymer, and the results on our patients who had been wearing PMMA lenses were remarkable,” Dr. Rosenthal says, “That is, until about 2 or 3 months into the wearing, when some patients developed red eyes and corneal staining, none of which could be accounted for by the fitting characteristics of the lenses.”

Because patients were using wetting/soaking solutions that had been developed for PMMA lenses, Dr. Rosenthal speculated that the solutions could be causing these problems, so he and his colleagues set about developing solutions specifically for GP lenses.

“I hypothesized that the negative charges on the surface of the lenses due to the wetting agents in the polymer must be attracting positively charged, potentially toxic molecules in the soaking solutions,” he says. “So we developed our own soaking solution, exploiting the electrolytic charges in the polymer, and mixed the solutions and filtered them through a millipore filter into sterile bottles. The results were dramatic.

“About 3 months later, however, the same patients who had been doing well returned with complaints of irritation,” Dr. Rosenthal says. “I found a wax-like deposit on the lenses that I could not remove except by polishing. I then asked our chemist Ed Ellis to create an emulsion cleaner that contained a very fine abrasive component. One month later, he had developed a cleaner that was very effective.”

In spite of this apparent success, Dr. Rosenthal says he worried that the need for special solutions would be “the death knell” for the Boston products. “After all,” he says, “who would want to sell our lenses if they also needed a system of solutions. How wrong I was!”

Today, more than 80% of all gas permeable solutions sold in the United States, and more than 60% around the world, are Boston brand.

Solving patients’ problems still drives the Boston brand, says Michael Mulgrew, vice president of global marketing for lens care. Over the years, lens care products have been improved and enhanced. For example, the preservative chlorhexidine was replaced with polyamino propyl biguanide, and the antimicrobial efficacy of the conditioning solution was improved. The line was expanded to include rewetting drops, liquid enzyme cleaner and the single-bottle Boston SIMPLUS® Multi-Action Solution.

“Boston solutions are lens care products specifically designed for gas permeable lenses,” Mulgrew says. “And they reflect what consumers have told us they need and want.”
For this issue’s Spotlight, we spoke with Dr. Joe Barr, Vice President, Global Clinical & Medical Affairs and Professional Services, Vision Care.

Dr. Barr, you’ve been a contact lens advocate for many years, as a clinician, educator and researcher, please share your insights regarding the relevance of GP lenses in practice today. What do you feel is the most significant contribution of GP lenses to date?

Simply put: Great vision while maintaining corneal integrity. Even in cases where the eye is fragile, such as keratoconus and postsurgical irregular corneas, the GP lens delivers the best vision while nearly always maintaining the physiology of the cornea. In addition, these are cost-effective lenses for patients and clinicians. Who doesn’t like a long-lasting, healthy product that enables patients to see the world with clarity?

Are there still untapped applications for GP lenses?

I believe the largest opportunity for GP lenses is in the area of presbyopia correction. Whether with multifocal designs in early presbyopia, or current or improved designs in alternating vision/translating designs, many patients could benefit from this correction if we embrace the opportunity of training eyecare practitioners and informing consumers of the possibility.

What would you say to encourage contact lens practitioners to increase their use of GP lenses?

I can think of at least five types of patients or situations that contact lens practitioners encounter frequently for which I’d encourage them to think of GP lenses.

First, consider overnight orthokeratology for your youngest myopic patients. Second, whenever you’re fitting astigmatic patients who have corneal toricity that nearly matches their spectacle astigmatism, try recommending GP lenses for full-time wear. Third, for every case of irregular astigmatism, try a GP lens first. Fourth, when you encounter wearing challenges from soft lenses, such as inflammation, consider recommending a GP lens. And finally, again, think about GP lenses for presbyopes, especially GP wearers who are new presbyopes (these are a slam dunk). Remember to consider them when soft multifocals or monovision is not successful or when your presbyopic patient is especially motivated.

What improvements in GP lenses do you foresee?

As more systems become available, I believe companies and clinicians will be using topography data and wavefront data to work with labs to design better-performing lenses.

What areas of GP research do you feel are most promising and most exciting?

Certainly, we continue to explore myopia control and orthokeratology. There’s also a lot of excitement about scleral and semi-sclerals for irregular corneas. It would be good if some long-term data were available in this area.

How can clinicians improve their GP fitting skills?

B&L has some excellent training tools. Practitioners can contact their labs or the company directly and obtain educational programs on general GP fitting, ortho-k fitting and presbyopia correction. New tools are always in development, so we encourage practitioners to check in with the labs or B&L regularly. In addition, the GP Lens Institute (gpli.info) offers excellent training programs.

Is there a forum that you would recommend for clinicians to share information on their GP cases?

The GPLI posts interesting cases on its Web site. However, this is an area that could be more fully exploited. Some other sources to check are the online forum at optcom.com as well as users groups from the various manufacturers. If you know of others, we would love to hear about them so we can pass them along.

Please provide some insight into your role with B&L and your immediate and long-term goals.

I work with clinical affairs leader Dr. Mo Merchea and his teams in Rochester, N.Y., and Waterford, Ireland, as well as Dr. Bill Reindel and Dr. Gerard Cairns in medical affairs. We collaborate with clinicians around the world to test new lens and lens care products to support our research and development efforts and create new science. We share this evidence with our other director of medical affairs Dr. Gary Orsborn, who assists our strategy and marketing teams, and with Dr. Carla Mack, who drives our academic program support, new educational and publication efforts to support our business globally. Our team also works with U.S. and global professional services managers to support eyecare professionals worldwide.

Our major goals are innovation, education, service and building partnerships with our customers in an ever-improving way.

Dr. Barr lives in Rochester during the work week and in Dublin, Ohio, with his wife and daughters on weekends when he is not on the road. He enjoys sports, especially running, and he likes to cook. He enjoys playing with his grandson and holding his granddaughter.

Dr. Barr at the 2007 meeting of the American Optometric Association in Boston.
Hecht Contactlinsen (Germany) recently celebrated its 30th year as a custom contact lens manufacturer. Some 30 opticians from key accounts attended a weekend seminar to discuss new opportunities with the Hecht Apex system, an advanced automatic lens fitting system. In the photo above, Ewald Steiert and Dieter Muckenhirn, founders and shareholders of the company, along with their professional team accept a Parma ham as an anniversary gift.

Some 350 ophthalmologists attended the annual congress and industry exhibition of the European Contact Lens Society of Ophthalmology (ECLSO) in Vilnius, Lithuania. Left to right: Marcel Kopito, Region Director Europe, Dr. Florence Malet, ECLSO, Jolanta Bendorienne, president, Lithuanian CLSO.

I-Go Optical, a new consumer marketing company promoting ortho-K in the UK, joined this year’s British Contact Lens Association meeting in Birmingham, England. Left to right: Malcolm Hughes, chairman, I-Go Optical Ltd.; Jennifer Golden, marketing manager; Trusit Dave, professional service director, Optimed UK; Basil Bloom, founder of the British Orthokeratology Society.

Jackson Leung, Region Manager Asia, checks a contact lens fit during a Boston Seminar 2008 educational event in Taiwan.

Oska Lau speaks to participants at a Boston Seminar 2008 event in Taiwan.